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THE EFFECT OF EDUCATIONAL VIDEO ON KNOWLEDGE OF PERSONAL PROTECTIVE EQUIPMENT FOR ROAD BARRIER WORKERS OF PT X KLATEN

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ABSTRACT

PT X Klaten is a subcontractor in the road construction project, responsible for manufacturing road barriers that function as safety signs and lane dividers. This type of work involves multiple occupational hazards, such as injuries from sharp materials, falling objects, and accidents involving project vehicles, particularly during night shifts. An initial survey revealed that 70% of workers had limited knowledge of Personal Protective Equipment (PPE), contributing to low compliance and an increased risk of workplace accidents. This study aims to examine the effect of educational videos on improving PPE knowledge among road barrier workers at PT X Klaten. A quasi-experimental design was employed using a pre-test and post-test control group. Total sampling was applied to recruit 50 respondents, who were equally divided into experimental and control groups. The intervention consisted of a two-week educational video program incorporating animations and real-life demonstrations that explained the types, functions, and proper use of PPE in construction settings. Data were collected using structured questionnaires and analyzed through Paired Sample T-tests and Independent Sample T-tests. The results have shown a significant increase in PPE knowledge in the experimental group, p-value = 0.001 ($p \leq 0.05$), while the control group exhibited no significant change, p-value = 0.422 ($p > 0.05$). The comparison between groups has revealed a statistically significant difference in post-test scores, Sig (2-tailed) value = 0.017 ($p \leq 0.05$). These findings demonstrate that educational videos are an effective medium for enhancing PPE-related knowledge among construction workers. This approach can be applied more broadly in other high-risk industries as a practical strategy to improve occupational safety, increase PPE compliance, and reduce the incidence of work-related accidents.

Kata Kunci:

Video Edukasi;
Pengetauan;
Alat Pelindung Diri;
Penghalang Jalan;

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ABSTRAK

PT X Klaten merupakan subkontraktor di proyek konstruksi jalan yang bertanggung jawab dalam pembuatan road barrier yang berfungsi sebagai rambu keselamatan dan pemisah jalur lalu lintas. Jenis pekerjaan ini memiliki berbagai potensi bahaya kerja, seperti luka akibat benda tajam, tertimpa benda berat, serta risiko kecelakaan dengan kendaraan proyek, terutama saat bekerja di malam hari. Survei awal menunjukkan bahwa 70% pekerja memiliki pengetahuan yang terbatas mengenai Alat Pelindung Diri (APD), yang berkontribusi terhadap rendahnya kepatuhan dan meningkatnya risiko kecelakaan kerja. Penelitian ini bertujuan untuk mengetahui pengaruh video edukasi terhadap peningkatan pengetahuan tentang APD pada pekerja road barrier di PT X Klaten. Penelitian ini menggunakan desain kuasi-eksperimen dengan kuasi dengan desain pre-test and post-test control group. Teknik total sampling digunakan untuk mendapatkan 50 responden yang dibagi secara merata ke dalam kelompok eksperimen dan kontrol. Intervensi yang diberikan berupa program video edukasi selama dua minggu yang mencakup animasi serta demonstrasi langsung yang menjelaskan jenis, fungsi, dan cara penggunaan APD secara benar di lingkungan kerja konstruksi. Data dikumpulkan menggunakan kuesioner terstruktur dan dianalisis dengan uji Paired Sample T-test dan Independent Sample T-test. Hasil penelitian menunjukkan adanya peningkatan pengetahuan APD yang signifikan pada kelompok eksperimen p-value = 0.001 ($p \leq 0.05$), sementara kelompok kontrol tidak menunjukkan perubahan yang signifikan p-value = 0.422 ($p > 0.05$). Perbandingan antara kedua kelompok menunjukkan perbedaan yang signifikan pada skor post-test Sig (2-tailed) value = 0.017 ($p \leq 0.05$). Hasil ini menunjukkan bahwa video edukatif merupakan media yang efektif untuk meningkatkan pengetahuan terkait APD pada pekerja konstruksi. Pendekatan ini dapat diterapkan secara lebih luas di industri berisiko tinggi lainnya sebagai strategi praktis untuk meningkatkan keselamatan kerja, kepatuhan terhadap penggunaan APD, dan menurunkan angka kecelakaan kerja.

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INTRODUCTION

The construction industry is known to have one of the highest rates of occupational accidents due to the involvement of a large workforce, use of heavy machinery, and high-risk working environments (Arisandi, 2019). Data from the International Labour Organization (ILO) in 2018 reported that occupational accidents and diseases in the construction sector account for 380,000 deaths annually, representing 13.7% of the 2.78 million work-related fatalities worldwide. Additionally, more than 374 million workers suffer from non-fatal injuries or illnesses each year. In Indonesia, data from BPJS Kesehatan (2020) shows that the construction and manufacturing industries contributed to 63.6% of all reported workplace accidents, with several resulting in fatalities (International Labour Organization, 2018).

Prevention of accidents in the workplace should involve collaboration between the government and all businesses to ensure that their employees wear PPE. The use of personal protective equipment (PPE) is one of the efforts to reduce the impact of potential hazards at the workplace (Putty.P, 2022). Therefore, it is essential for companies to comply with government regulations, specifically Permenakertrans No. PER 08/PRIA/VII/2010. This regulation stipulates that workers are required to use PPE appropriate to the potential hazards at the workplace, as outlined in Article 6, Paragraph 1, which states that every worker must wear protective equipment suited to the hazards present at the workplace.

Road barriers are part of road infrastructure that serve as an additional safety measure to reduce the impact of accidents (Mufhidin & Maksum, 2021). Road barrier manufacturing work involves the use of heavy equipment and various materials with a high level of hazard risk for workers; therefore, companies must provide and require the use of PPE (Rifani et al., 2018). However, facts in the field show that there are still workers who do not use PPE due to a lack of knowledge regarding potential hazards, functions, and use of PPE in the workplace. Lack of education leads to low knowledge and awareness of construction workers in Indonesia on the importance of using PPE (Nafista et al., 2022).

PT X Klaten is a road construction sub-contractor company that is responsible for making road barriers or road dividers that function as safety signs and separators between lanes on the road. Making road barriers requires a lot of daily labor to do iron assembly, finishing, making dilations, etc. Based on field observations, road barrier work has potential hazards such as hands being scratched or punctured by iron and wire when doing reinforcement work, feet stepping on sharp materials at the work site, falling objects, slipping and hitting the head, and the possibility of being hit by project vehicles, especially when working at night. Thus, PPE is needed in the form of gloves and safety shoes, as well as standard PPE for other construction work, such as safety helmets and safety vests. PT X Klaten has provided personal protective equipment (PPE) for each worker as an effort to reduce potential hazards at the work site, but there are still some workers who do not use the PPE that has been determined.

Through the results of interviews, it is known that road barrier workers have never been given further training or socialization regarding the functions, benefits and correct use of PPE at the work site so that some workers stated that they did not know that they only had to use PPE during work and did not understand the benefits of using PPE which resulted in many workers ignoring the use of PPE at the work site. This is in accordance with the results of measuring knowledge using a personal protective equipment (PPE) knowledge questionnaire to 10 workers, which shows the results of 70% of workers in the poor category, 20% in the sufficient category, and 10% in the good knowledge category. The company needs a solution to improve workers' knowledge of personal protective equipment (PPE). Efforts that can be made are to provide knowledge or education related to personal protective equipment (PPE) to road barrier workers. Education can be provided through various media, one of which is educational videos, which are audio-visual media (International Labour Organization, 2018). Educational videos have the potential to be an effective learning tool because they can attract a person's attention, motivate them to learn, and provide a faster understanding of the material (Andriana Johari, 2014)

Based on the issues identified in the field, this study aims to determine "The Effect of Educational Videos on Knowledge of Personal Protective Equipment on Road Barrier Workers of PT X Klaten."

METHOD

Type of Research

This study employed a quasi-experimental design with a pre-test and post-test control group. The intervention consisted of an educational video on personal protective equipment (PPE), which included materials on the types, functions, and proper usage of PPE in road barrier construction. The content was developed based on national occupational safety standards and validated by experts in the field. The video was designed to be informative and accessible, aiming to enhance knowledge retention. The control group did not receive any intervention, serving as a basis for comparison.

Place and Time of Research

This research was conducted at one of the road construction projects being carried out by PT X Klaten. From February to June 2024.

Population and Sample

The population of this study consisted of all workers in the road barrier casting unit of PT X Klaten, totaling 50 individuals. A total sampling technique was applied, with 25 participants assigned to the experimental group and 25 to the control group.

Data Collection

Data collection was carried out using a questionnaire to measure the knowledge of personal protective equipment (PPE) among road barrier casting workers at PT X Klaten. Knowledge was assessed through pre-test and post-test in both the experiment and control groups, using a Guttman scale. This scale was chosen to obtain clear, definitive responses regarding the workers' understanding of PPE.

Data Analysis and Processing

Data processing and analysis were performed using univariate and bivariate analyses with IBM SPSS (Statistical Package for the Social Sciences) software. Univariate analysis was used to describe the frequency distribution of each variable, while bivariate analysis examined differences and relationships between variables relevant to the study objectives.

Prior to conducting these analyses, data were tested for normality using the Shapiro-Wilk test. The results showed that both the pre-test and post-test data for the control and experimental groups were normally distributed. Specifically, the control group pre-test ($p = 0.728$) and post-test ($p = 0.684$), as well as the experimental group pre-test ($p = 0.412$) and post-test ($p = 0.283$), all had p-values greater than 0.05. Since all data were normally distributed, Paired Sample t-test and Independent Sample t-test were used for hypothesis testing. A Paired Sample t-test was used to compare knowledge levels before and after the intervention within each group, while an Independent Sample t-test was employed to compare post-test results between the experimental and control groups.

RESULT

Respondent Characteristics

Table 1. Frequency Distribution of Respondent Characteristics

No.	Respondent Characteristics	Control Group		Experimental Group	
		Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
1	**Age**				
	< 30 Years	4	16	4	16
	≥ 30 Years	21	84	21	84
2	**Last Education**				
	Not graduated	0	0	1	4
	Elementary school	4	16	4	16
	Middle School	9	36	8	32
	High School	12	48	12	48
3	**Length of Service**				
	< 1 Year	16	64	18	72
	1 - 3 Years	9	36	7	28

Source: Primary Data, 2024

The table presents the demographic characteristics of respondents from both the experimental and control groups. Overall, the distribution of respondents is relatively balanced between the two groups in terms of age, education level, and work experience. Most participants fall within the productive age range, and a majority have a high school education level, which may influence the mode of effective knowledge delivery. Additionally, most respondents have over one year of work experience, suggesting a baseline familiarity with the work environment. This demographic consistency between groups helps ensure that any observed differences in knowledge outcomes can be more confidently attributed to the educational intervention rather than to differences in respondent characteristics.

Effect of Educational Video on Knowledge of Personal Protective Equipment in the Control Group

In the control group, the highest pre-test scores were recorded on Q8 (76%) about the obligation to use PPE, while the lowest were on Q11, Q16, and Q17 (32%) about the types, functions, and purpose of PPE. Post-test results showed minimal change, with most items remaining constant, indicating limited spontaneous knowledge improvement in the absence of intervention.

Table 2**.** Results of Personal Protective Equipment Knowledge in the Control Group

Knowledge	N	$\bar{X} \pm SD$	Δ	*p*	Category
Pre-test	25	7,88 ±3,004	+0,2	0,422	Low
Post-test	25	8,08 ±2,691			Low

Source: Primary Data, 2024

Based on Table 2, it can be seen that the average score in the control group during the *pre-test* was 7.88 with a standard deviation of 3.004. Meanwhile, the average score of the control group respondents during the *post-test* was 8.08 with a standard deviation of 2.691. The increase between the mean score of the pre-test and post-test of the control group was 0.2. Based on the results of the statistical test of *pre-test* and *post-test* in the control group, the p value = 0.422 (p> 0.05) means that there is no significant effect between the *pre-test* and *post-test.*

Effect of Educational Video on Knowledge of Personal Protective Equipment in the Experimental Group

In the experimental group, the highest pre-test scores were on Q8 (84%) about the obligation to use PPE, followed by Q6 and Q4 (76%) on PPE requirements. The lowest scores were on Q13, Q11, and Q16 (under 32%) about the use of a chin strap, types of PPE, and the function of a safety vest. Post-test results showed improvement in all items, with the largest gains in Q2 (types of PPE) and Q14 (function of gloves) at +20%, followed by Q9 (workplace hazards) and Q15 (proper glove use) at +16%.

Table 3**.** Results of Personal Protective Equipment Knowledge in the Experimental Group

Knowledge	N	$\bar{X} \pm SD$	Δ	*p*	Category
Pre-test	25	8,28 + 2,836	+1,72	0,001	Low
Post-test	25	10 + 2,799			Moderate

Source: Primary Data, 2024

Based on Table 3, it can be seen that the average score in the experimental group during the *pre-test* was 8.28 with a standard deviation of 2.836. Meanwhile, the average score of the experimental group respondents during the *post-test* was 10 with a standard deviation of 2.799. The increase between the average scores of the experimental group was 1.72. Based on the results of the

paired sample t-test test in the experimental group, the p value = 0.001 (p < 0.05) means that there is a significant change between the *pre-test* and *post-test.*

Effect of Educational Video on Knowledge of Personal Protective Equipment between Control and Experimental Groups

The highest pre-test scores in both groups were found on question No. 8 regarding the obligation to wear PPE, while the lowest post-test scores were recorded on question No. 13 about the use of chin straps for the experimental group and question No. 11 regarding the types of PPE for the control group. Based on the score differences, the experimental group performed better on 14 questions compared to the control group.

Table 4. Results of Personal Protective Equipment Knowledge in Control and Experimental Groups

Knowledge	N	Pre-test $\bar{X} \pm SD$	Post-test $\bar{X} \pm SD$	Δ	*p*	Increase Category
Control	25	7,88 ± 3,004	8,08 + 2,691	+1,92	0,016	Minimal
Experiment	25	8,28 + 2,836	10 + 2,799			Significant

Source: Primary Data, 2024

Table 4 indicates a statistically significant difference in post-test knowledge scores between the control ($\bar{X}$ = 8.08, SD = 2.691) and experimental groups ($\bar{X}$ = 10, SD = 2.799), with a mean difference of 1.92 ($p = 0.016$, $p < 0.05$). The difference in the average *post-test score* between the experimental and control groups is 1.92. These findings confirm that the intervention significantly improved knowledge levels in the experimental group compared to the control group.

DISCUSSION

Respondent Characteristics

Based on the results of the study, the majority of respondents were aged ≥ 30 years (84%), indicating that this age group may possess greater experience and knowledge regarding the use of personal protective equipment (PPE). As individuals age, their cognitive capacity generally develops, although a decline in cognitive abilities may begin to occur after the age of 30 (Salthouse, 2019). This finding aligns with previous research showing that older individuals tend to have more experience, which can enhance their understanding of workplace safety and PPE usage (Salminen, S., Kivimäki, M., Elovainio, M., Vahtera, 2019). (Cheng, C. W., Leu, S. S., Lin, C. C., Fan, 2012) also support this, stating that a person's knowledge tends to improve with age, with older workers more likely to recognize and apply safety procedures.

Education level also plays an important role in the amount of knowledge a person has. Most respondents in this study were high school graduates (48%), suggesting that education influences workers' understanding of the importance of PPE. Higher education levels are generally associated with an increased ability to receive and apply information, including workplace safety practices (Fitria, Y., Rahayu, D., Putri, 2022). This is consistent with findings by (Rahayu E, 2020), who stated that the higher a person's education level, the greater their knowledge tends to be. Therefore, workers with lower levels of education may require more intensive training approaches to ensure they fully understand how to use PPE properly.

Most of the respondents in this study had less than one year of work experience (68%), indicating that the majority were new workers. New workers may have limited knowledge of PPE usage, as they have not yet gained sufficient workplace experience. This is supported by (Widyanto, 2021) who explained that shorter work duration is directly related to lower levels of knowledge about safety procedures. Another study by (Salim, R., Maulana, A., Sari, 2021) also found that more experienced workers tend to have a better understanding of safety and PPE use.

Effect of Educational Video on Knowledge of Personal Protective Equipment in the Control Group

Table 3 shows that the control group obtained an average pre-test knowledge score of 7.88, which falls into the low category. The post-test average score was slightly higher at 8.08 but still remained within the same category. The minimal increase of only +0.2 suggests that there is no meaningful improvement in knowledge among the control group. One possible explanation for this slight increase is individual initiative; some respondents may have independently sought information, such as by asking coworkers or accessing alternative sources like the internet or social media. According to recent studies, self-directed learning allows individuals to identify their learning needs, seek resources, and monitor their progress, even without formal instruction (Candy, 1991)

The results of the statistical analysis also support this, with a p-value of 0.422 ($p > 0.05$), indicating no statistically significant difference between the pre-test and post-test scores. This outcome is expected, as the control group did not receive any intervention in the form of educational videos and served solely as a comparison to the experimental group. These findings are consistent with the study by (Setiani, D. Y., 2020) which found that knowledge levels in control groups tend to remain unchanged when no treatment or educational intervention is provided. Other contributing factors may include limited work experience, lack of motivation, or low initiative to seek safety-related knowledge. These findings emphasize the need for structured and engaging educational interventions to effectively improve knowledge on PPE use.

Effect of Educational Video on Knowledge of Personal Protective Equipment Experimental Group

Based on Table 4, the average knowledge score of respondents in the experimental group during the pre-test is 8.28, which falls into the low knowledge category. However, the average score in the post-test increased to 10, placing it in the moderate knowledge category. The difference between the pre-test and post-test average scores in the experimental group is 1.72, indicating an improvement. This increase in knowledge can be attributed to the educational treatment provided through videos, which facilitated the transition from low to moderate knowledge.

The results of the statistical test have shown a p-value of 0.001 ($p < 0.05$), indicating a significant effect of educational videos on workers' knowledge of personal protective equipment (PPE). This supports the theory that knowledge is gained through learning and experience from various sources, including educational videos (Davis R., 2019). Videos, through their audiovisual nature, engage multiple sensory pathways and are processed by the brain, leading to the formation of memories that can change an individual's knowledge (Mayer & Fiorella, 2021). These findings are consistent with research by (Yuliana, S.,Taufik, 2022) which suggests that short-term interventions such as educational videos are effective in improving knowledge. Moreover, (Salma, 2023) found that educational video interventions conducted twice a week significantly enhanced knowledge levels. The significant improvement observed in the experimental group aligns with these studies, demonstrating the effectiveness of multimedia interventions in enhancing knowledge retention.

Effect of Educational Video on Knowledge of Personal Protective Equipment between the Control and Experimental Groups

Table 6 shows the post-test results between the experimental group and the control group. The post-test average score for the control group is 8.08, which falls into the "less" category, while the experimental group has a higher average score of 10, placing it in the "sufficient" category. The difference of 1.92 between the two groups indicates a noticeable improvement in the knowledge of the experimental group regarding personal protective equipment (PPE).

The statistical analysis confirmed this difference with a p-value of 0.016 ($p < 0.05$), indicating a significant effect of the educational video intervention on the experimental group's knowledge compared to the control group. This result suggests that the educational videos were effective in enhancing the workers' understanding of PPE. One possible explanation for this improvement is the engaging nature of educational videos, which combine visual and auditory elements to reinforce learning. These multimedia elements likely helped the experimental group retain and comprehend the information better than the control group, which did not receive the intervention.

The findings are consistent with the study by (Aribowo & Muttaqin, 2019) which demonstrated significant improvements in the knowledge of an experimental group that received an educational video

intervention, compared to a control group that did not. This similarity suggests that educational videos are a promising method for improving knowledge retention and understanding, especially in occupational safety contexts, where practical knowledge of PPE is critical for worker health and safety. By integrating such videos into construction training programs, companies can enhance workers' safety awareness and ensure they receive clear, consistent, and engaging information on PPE usage. This approach not only supports better knowledge retention but also fosters a culture of safety, ultimately reducing workplace accidents and improving overall safety compliance.

CONCLUSION AND SUGGESTION

Based on the results of research that has been conducted related to the effect of educational videos on the knowledge of personal protective equipment on PT X Klaten road barrier workers, it can be concluded as follows:

1. There is a significant effect (p-value = 0.001) between educational videos on knowledge of personal protective equipment in the experimental group.
2. No significant effect (p-value = 0.422) is observed in the control group, indicating that the control group, which does not receive the video intervention, shows little or no improvement in their PPE knowledge. This result emphasizes that providing educational videos is an effective method for increasing knowledge, while relying on traditional methods without structured interventions may not yield similar outcomes.
3. There is a significant difference in PPE knowledge between the experimental and control groups, with a p-value of 0.016 ($p < 0.05$), suggesting that educational videos can significantly enhance workers' understanding of PPE compared to non-intervention methods.
4. Companies should integrate educational videos into their OHS training programs. Additionally, combining videos with hands-on training and mentoring in PPE usage can further improve workers' understanding and compliance, creating a safer work environment.
5. Future research should explore the combined impact of educational videos, hands-on training, and mentoring in improving PPE knowledge and examine the long-term effects on safety behaviors across different industries.

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